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East Europe Report

ECONOMIC AND INDUSTRIAL AFFAIRS

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SHORTCOMINGS IN COMMUNAL SERVICES EXAMINED IN VLORE SEMINAR

Tirana ZERI I POPULLIT in Albanian 10 Jan 82 p 3

[Article by Mitro Cela: "On Initiatives and Fantasies in Regard to the Improvement of the Level of Communal Services"]

[Excerpts] A few days ago the Party Central Committee organized a national seminar in Vlore to discuss problems of communal services. Opinions were exchanged on the further improvement of this sector by implementing the decisions of the 8th party congress. Some 6 months ago, the communal enterprises, the party committee, the executive committee, and the mass organizations in Vlore District and the Ministry of Communal Economy began to prepare for this seminar. The idea was that the communal services system in this district should be an example for the others. Some results were achieved during this period.

It was emphasized in the seminar that a number of successes have been achieved in raising the level of services, improving quality and expanding new activities. Workers in this sector in Vlore, Tirana, Librazhd, and Korce have had good experience in this area. But in order to achieve the results the party demands in repairs and services, it is necessary that work be done in a cultured, knowledgeable, and competent manner. What is the present situation? In some cases the needs of the people are not properly satisfied. This indicates that the long range aspects are forgotten; the studies scratch the surface of the problems.

In the seminar, the following question was asked: Why do people try to have some services done through private channels? The reason can be found in the poor quality of repairs of television sets, washing machines, the poor quality of stitching on garments, etc. Violations of schedules are frequent in shoe repair and dressmaking units. There are delays in the distribution of firewood. The fact that these defects occur repeatedly shows that the monitoring and accountability processes have not yet been placed on sound organizational bases. The problems cannot be solved solely by appealing to the consciousness of the workers; this appeal must be accompanied by persuasive measures, organization, supervision and accountability.

The 8th party congress set the task of expanding communal service and repair services in the villages. The seminar analyzed the experience gained in this area in Vlore District. Within a short period of time, 100 specialists were trained to work in the villages. Several new units were opened and the communal services system was equipped with the necessary means. In order to combat delays, emphasis on minor matters, and backward concepts and methods, the district party committee took hold of the matter and assigned tasks to the executive committee of the people's council of the district, the mass organizations, the communal enterprises, the peoples councils of the villages, etc. The Ministry of Communal Economy also gave concrete assistance. Within a short time, services were expanded and the quality was improved. On this basis, the task was assigned to study, plan and disseminate this experience throughout the country. In order to better serve the cooperative members, the workers in the communal economy must radically improve their work; they must carry out thorough studies and strengthen their collaboration with the mass organizations and the government organs.

During this five-year plan 80,000 apartments and houses will be built in the cities and villages. In addition to the contribution of the masses, more than a billion leks will be invested by the state in their construction. They will be managed and maintained by the workers of the communal economy. It was emphasized in the seminar that many problems which seek solutions have arisen in regard to the construction and maintenance of housing units. For example, last year, investment projects were not completed in some districts. There have been cases where the construction cf apartments has been stretched out for a very long time. Why does this happen? The completion of construction work on time depends, first of all, on the setting aside of a construction area. Work experience in Korce, Pogradec, and Vlore proves this fact. How can the apartments in Shkoder, Durres and Lushnje be completed on schedule when the beginning of the work is postponed from one month to another because construction areas have not been set aside on time? This is an indication of lack of fruitful cooperation between investors and builders in resolving problems on time and overcoming difficulties. Recently, good work has been done in the area of centralization, which has helped to improve quality, reduce costs and achieve the completion of the housing units on schedule. But centralization has not become a work method everywhere. As a result, materials are wasted and means of transportation and other machines are not used effectively.

The seminar stressed that defects are evident in the quality of the housing units. Before the builders leave the units, the plaster is cracking, the plumbing installations are leaking, and the doors and windows barely open and close. This happens because the communal workers do not make inspections during the construction phase. The builders make very few complaints about the quality of the bricks, limestone, lumber, etc. The defects increase during the maintenance of the apartments. Some communal enterprises do haphazard repair work. Often they do not adhere to the set schedules. This situation, it was emphasized in the seminar, should be a matter of serious concern for the basic organizations of the party and their levers. The communists, workers, and specialists in this sector should be creative and innovative; they should find new work forms, more diverse and more skillful methods, to extend the life of the housing units.

CSO: 2100/50

TU OFFICIAL URGES IMPROVED WORKER APPROACH TO ECONOMY

Bratislava PRACA in Slovak 23 Jan 82 pp 1, 2

[Article by Jan Visvader, editor in chief of PRACA: "It Is in Our Hands"]

[Text] The 14th plenum of the Central Trade Union Council [URO] ended last Wednesday. On the agenda were very topical and socially important questions. The entire trade union membership should pay the maximum attention to them. These questions represent not only the key for further work but literally arouse the entire trade union aktiv to better and more direct participation of members in the fulfillment of tasks. They also stimulate each and every trade union functionary to understand and accept the role of the trade unions and increase his participation in solving problems. No tactic of foot-dragging or shadow-boxing can result from good trade union activity. Often even labor discipline falls short of the required level. The trade unions should take partial blame for the fact that we have lost 1.3 million days in our republic--which represents an economic loss of Kcs 1.13 billion--in the past 3 years. There are obviously shortcomings in our educational work.

In the first place, members of the URO evaluated the course and results of annual membership meetings and conferences of the ROH [Revolutionary Trade Union Movement] basic organizations and the progress toward the preparations for the 10th All-Trade Union Congress. The plenum univocally stated that in spite of certain shortcomings these meetings and conferences fulfilled their missions and showed that the ROH activity is related to the interests and needs of our working people and the goals of our society. The annual meetings evaluated the results and the share of the ROH in the fulfillment of the party's economic and social program and the efforts of the trade unions in caring for the development of the national economy, the growth of production, the rights and interests of our workers as well as the conditions of the workers' work and life. These meetings also offered a chance to search for points of departure and for efforts to assist in the solution of complex and, compared to previous years, more demanding national economic tasks. True, they also constituted a tribune for open and sincere criticism of shortcomings which linger on and often negatively affect results. Many meetings and conferences heard unmerciful criticism of bad management, insufficient organization of labor and insufficient work with people and discussed how to make our workers more interested in the fulfillment of tasks. There are plenty of agitators who say "tell the truth to our people," but those who really tell the truth are fewer. And often we depend on the latter to secure a broad and creative participation and unselfish support of our people in securing our tasks. In the end, our people will not only understand but will even be grateful if we express our confidence in them. Why should we ignore this Leninist principle? Such attitudes result in the fact that certain methods are reflected in the conclusion and fulfillment of collective contracts and affect the level of production meetings and interest in them. And even if the initiative of our workers often makes up for shortcomings in planning, management and organization, there is still a lack of parameters of high activity and enthusiasm. When there is no appreciation or if this appreciation is done only mechanically, our workers lose their healthy and enthusiastic attitude. And this enthusiasm should be revived from day to day. Ideas planted among our people should lead them to spontaneous activity. The conferences showed that we still have enterprises which fail to appreciate the participation of our workers in management. Also, the introduction of the new system of measures, long-range planning, remuneration, etc, is not done in all places in such a way as to be adopted everywhere and to have results.

Too much was said and summarized to permit a practical and concrete echo which would lead us to a solution Even such a question as price policy was handled at many conferences in such a way as to demand that price policy be related to wage and social policy in order to prevent waste and correctly affect the development of personal needs.

The members of the URO concentrated at their meeting on the tasks of the ROH in securing the national economic plan in 1982. Naturally, the basic idea at the meeting was to orient the entire trade union movement to active support for developing our economy and securing our standard of living. These plans will put high demands on the participation of our workers in the fulfillment of each task, meeting all qualitative indices, and economizing as well as in more effective ideological-educational and mass political work. We are still behind in mass political work because the latter is still not sufficiently reflected in our attitudes and relations. Why do we say high demands? Because our economy reacts to new outside influences, must work with limited material resources and deal with certain unforeseen complications, especially in foreign trade relations.

Our problem is that at the present stage the trade union organs and functionaries at workplaces must openly and consistently explain to our workers the conditions governing the fulfillment of this year's plan and through their organizational activity and adoption of correct measures encourage and direct initiative. No production sector where the tasks are not being fulfilled should stay outside the [illegible] attention. Even if it is up to the enterprise's management, the trade union functionaries should with equal responsibility pay attention to the adaptation of industrial production to the needs of foreign and domestic markets, new products, progressive changes in the structure of production and to the sufficiently flexible application of scientific and technical development. True, to this are related all supportive steps--organization, management, care for the innovators' movement, rationalization of labor, the level of initiative and competition, new appropriate methods and forms of work, scientific approach and relations with workers and concern about their interests. In other words, a real and informal Leninist style of work.

Yes, this was emphasized by the URO which demands from its members and functionaries better activity. There is no other way as far as cooperation and coresponsibility is concerned. Only in this way can we improve our trade union activity. Our trade unions have enough strength and ability and they are also ready to master positive participation in the plan, establish effective control and help improve our economy. At the same time, however, they must carefully listen to the opinions of the masses, understand their needs more and more and secure the justified interests of the working people.

The targets of this year's plan are known. They anticipate an increase in the volume of the national income of Kcs 2.5 billion. The direction, how to achieve this goal, has been stated. In addition to production tasks, this goal can be achieved through savings in production, consumption, growth in the social productivity of labor, structural changes in industrial branches and sectors which bring in foreign currency and improved use of domestic raw materials. If we translate all this into a more concrete picture in our engineering industry, we are talking about faster innovation, improved reliability, quality and efficiency of machines, and of technical level, and broader selection of consumer products. In our electrical engineering sector, it means catching up with our backlogs and gradually reaching the peak. In agriculture, it means increasing production 3.2 percent and solving the disproportions between plant and animal production.

It is known that in spite of saving measures, noninvestment expenditures for social services and activity are anticipated to be Kcs 8,706 per capita in 1982. The volume of social assistance will increase 2.6 percent and financial incomes of our people should grow by Kcs 10 billion. Yes, we also talk about the development of our people. And for this reason the trade unions are supportive of all these ideas. They support them by trying to fully engage all our people in them. They insist that the breakdown of the plan into interenterprise units at each and every workplace makes it possible to reach the ears of all our workers and that together with them the forms of initiative be worked out. The idea is to count on the help of the people and to increase their interest and will. And to break down the plan for each and every workshop and therein for each and every individual. All this requires the implementation of the principles of the new system of measures. It is necessary to courageously resist every manifestation of inconsistency and irresolute implementation of these principles or a mere administrative approach. The new system of measures ought to be applied everywhere in accordance with local conditions. The basis of success lies in long-range planning in spite of numerous obstacles in material-technical deliveries of supplier-customer relations. Here there is much elbowroom in lagging production for the initiative of collectives and enterprises in order to strengthen the role of the plan vis-a-vis the state plan.

To all this is closely related a need for a faster and broader application of the results of science and technology. In this respect the trade unions, as emphasized at the plenum, fully support the mobilization of all creative forces, social and working activity in support of improved quality, reliability and technical-economic level of products. At every work place they ought to do something about the unjustifiably long period necessary to solve problems and implement tasks in practice. After all, often many new products only reach the market after 10 years, when the world's producers are already offering products of a new generation. There are many examples in our country where we hear talk that we can solve this problem. However, what is needed is courage and a new approach. It is bad when out of 120 generally recognized basic research achievements realized in the CSAV and SAV most of them have never reached the practical stage. For this reason, the URO expects that individual trade unions and their commissions for innovators' and inventors' movement will discuss the plans of technical development and contribute to the development and utilization of new technology in production. We hope to increase cooperation between economic organizations and individual trade unions, we expect better use of brigades of socialist [BSP] and KRB [comprehensive efficiency brigades], inventors and innovators. We hope for more personal and collective plans of scientists and engineering-technical workers. The URO recommends the acceptance of associated socialist pledges, aiming at better cooperation between science and production.

We should not repeat what happened during the Sixth Five-Year Plan when out of 27,939 accepted patents 16,578 were not utilized at all and when out of 619,635 accepted innovation proposals 85,635 remained on paper. It is in these areas where a bureaucratic goblin is active and we, trade unionists, do not know how to get rid of him. It is necessary to give more assistance to innovators and inventors, to create a better atmosphere for all creative workers and thus to strengthen their authority.

The URO with equal urgency emphasized the significance of labor initiative and socialist competition. It also criticized their deformations, opportunistic attitudes and formalism. All these are well-known things which were criticized many times in the past and which do not go away. For this reason it is necessary to solve all these ills in a courageous way, firmly and perhaps with all the consequences. Otherwise we will remain in a vicious circle without achieving any desired effects. At the same time, many steps, solutions and tasks, on one hand, and obligations, on the other, should be reflected also in the collective contracts which ought to be negotiated everywhere not only at the level of enterprises but also plants. The last plenum of the URO emphasized again that the way to improve initiative is in improving relations between socialist competition and planning, in concrete pledges, in increased economic incentive for our workers, in comparing the results among individual collectives, and in the effective evaluation of results.

Consequently, it is indispensable for the trade union organs of all levels to fulfill their tasks, insist on their rights and obligations in the control of the plan, in other words, to carry out their economic function. Of course, they must uncompromisingly support the idea to uncover reserves, solve problems related to the causes of nonfulfillment of collective contracts and shortcomings in the organization of labor which slow down development. The trade union organs should, upon the recommendation of the URO, discuss in the presence of the management the situation in the plan fulfillment and the level of the plan's breakdown, check on the fulfillment of its main tasks, and use all these results for the negotiation of a collective contract.

All results--achievements and shortcomings--and all further development are in our hands. It is up to us what speed--in spite of outside influences--we adopt. It is up to us to deal with the difficulties we are facing.

1277
CSO: 2400/123

HIGHER ROLE OF 'SPOTLIGHT OF YOUTH MOVEMENT' URGED IN ECONOMY

Prague RUDE PRAVO in Czech 21 Jan 82 p 1

/Editorial: "Sharp Focus of the 'Spotlight'"/

[Text] The young generation has demonstrated on more than one occasion that it has an active rapport with the development of the socialist society. It is not lagging behind in that respect at present, either--in implementing a task of the first order, namely in making savings of raw materials, energies, fuels. Numerous youth collectives and even entire basic organizations of the Union of Socialist Youth are bringing frequent proofs of their zest, inventiveness, and creativity in the "Zenith" movement. This movement has already produced values amounting to millions for the benefit of our economy by applying innovating proposals and by saving tons of metals and raw materials.

The "Spotlight" movement of young people also demonstrates that the new generation is not indifferent to the question as to whether in some places the economic management does not act in the interest of the entire society, whether there is waste of resources which have come out and are coming out of the sweat of human labor. These young people are fighting against abuses, confusions, waste, violations of labor discipline, failures to observe laws and regulations.

This movement, which is led by young people, at the same time leads them themselves to assume responsibility for the tasks which have been entrusted to them, to have a socialist attitude to collective values.

The "Spotlight" of young people has won its place in the life of our society during 11 years of its activity. It is finding an increasingly broader response among young people. There are 85,000 members of the Union of Socialist Youth active in the present 25,000 patrols and 1,500 staffs, mostly in industrial establishments. By checking on economic operations, the "Spotlight" has returned to the national economy values representing Kcs 2.5 billion.

Members of the "Spotlight" have completed successfully seven statewide thematic inspections, which concentrated on savings of fuels, energies, production effectiveness, quality of labor and products, application of inventions and innovation proposals. They continue along that line. They are important aides in the implementation of the party line designed to increase the effectiveness of production and the quality of all labor. This activity was valued highly at the 16th CPCZ

Congress. It was pointed out that "...the party believes in the strength and ability of the young generation and will make sure that young people are entrusted with responsible tasks...."

Rightfully so. Most young people are not burdened with the established practice full of inertia, sterile routine, they have no inhibitions which would hamper them in surpassing what has been achieved before.

However, the patrols of the "Spotlight" of young people do not have a "green light" everywhere. That is very often related to the authority of the youth organization in the given establishment. In those places where members of the Union of Socialist Youth maintain good cooperation with members of trade unions, economic management, and listen to the advice of the party organization, they also discuss regularly the results of inspections conducted by patrols of the "Spotlight" of young people and get things straightened out. But in those places where such relationship is lagging, or where the activity of the youth organization is a mere formality, the effort of the "Spotlight" encounters difficulties, and shortcoming are remedied only in isolated cases.

There are even cases where the economic management interprets the activity of young people as some sort of an attempt to hamper its work. It argues that young people cannot understand the complex problems of the given manufacturing enterprise or establishment, and is willing to "give reasons" why the establishment must keep holding, for example, scrap iron, even though they do not need it, and when the scrap iron should have been actually in metallurgical works a long time ago. Or, as an example, someone from the Armabeton in Plzen, which handles construction work inside Ceramics Works in Chlumcany, has obviously destroyed a bulletin board which had publicized the results of an inspection carried out by a "Spotlight" guard. Photographic material was used as supporting documentation, giving names of the workers who were responsible. Who destroyed it? Probably someone who was subjected to criticism.

And so there still are people who may support criticism verbally, but heaven forbid if the criticism affects them personally or if it concerns a piece of work for which they are responsible.

The patrols of the young people's "Spotlight" deserve much praise. That is why the Central Committee of the Union of Socialist Youth purposefully regulates and organizes the patrols of the "Spotlight," particularly at selected investment constructions in Czechoslovakia. Acting side by side with party and trade union organs of the entire construction sites, these patrols are helping to develop the initiative of young people, they also bring the attention of other patrols to cooperation of organizations of the Union of Socialist Youth in dealing with relations between suppliers and buyers.

An uncompromising attitude to shortcomings and effort to deal vigorously with problems has always been characteristic of youth. The "Spotlight" of young people is always a big supporting factor in that respect. That is why its staffs and patrols must intensify even more their cooperation with people's control committees, the State Energy Inspectorate, the Union of Fire Fighters, recruit and bring into the movement more young manual workers, technicians, agricultural experts, be more consistent in discussing the results of inspections made in basic organizations of the Union of Socialist Youth, which in turn should insist that the economic management correct the situation faster. And that always requires consistency, frequently also personal courage, determination not to be discouraged by obstacles which one may encounter.

Central organs of the Union of Socialist Youth should also disseminate more information about experience gained by the patrols in their work, stimulate them purposefully to do their work while keeping in mind the goal to be reached. Kraj, okres, and all-factory committees of the Union of Socialist Youth must guide the patrols in their activities by assigning specific tasks to them, perhaps even by giving them one-time assignments, the purpose of which would be to determine the situation immediately. They must always inform all the members about the results, and mainly make each member participate in the effort designed to eliminate shortcomings. That has not happened too often so far, and as a result good initiative often foundered on the administration or on an underestimation of the "Spotlight" work.

It would be definitely beneficial if the committees of basic party organizations and party groups analyze carefully the findings and warnings of the patrols and support properly efforts to correct the shortcomings. Young people as a rule have a more critical attitude to everything which does not satisfy established principles and criteria. That is why, in the interest of solving the problems of the future development of socialist society in a complex manner, it is absolutely necessary to see to it that young people take part as much as possible in dealing with these problems. These young people can keep influencing the process fight now and bring about a more decisive approach to the handling of the urgent questions of the present days.

5668
CSO: 2400/122

CSR DEVELOPMENTS IN PRODUCTIVITY DISCUSSED

Prague SVET HOSPODARSTVI in Czech 31 Dec 81 p 3

[Article by Eng Bretislav Domisch, CSR Ministry of Labor and Social Affairs: "Labor Productivity Development in Selected Sectors"]

> [Text] The characteristic features of the development of the social productivity of labor during the Sixth Five-Year Plan were a decline in its rate of increase in comparison with the rate achieved during the Fifth Five-Year Plan and significant fluctuations of the increases of individual years. These trends are also clear in the basic production sectors--CSR industry and construction.

1. Basic Trends in Labor Productivity Development

While during the Fifth Five-Year Plan the average annual growth rate of the social productivity of labor (national income per employee) amounted to 5.5 percent in the CSR industrial sector, it declined during the Sixth Five-Year Plan to 3.4 percent. In the CSR construction sector, this decline was still more marked, from 5.2 percent to 1.3 percent. The above reduction in rates also appeared, of course, in a lower overall increase in the level of the social productivity of labor in comparison with the Fifth Five-Year Plan. For CSR industry, this increase amounted to 18.1 percent for the Sixth Five-Year Plan (a reduction of 12.6 points), while for CSR construction the increase was 6.5 percent (a decrease of 22 points). Fluctuations in the growth of the social productivity of labor (in construction for the years 1977 and 1979 there was even a decline in this level in comparison with the previous years) were caused above all by the uneven development of national income, increases in which fluctuated, for instance in CSR industry from 0.8 percent (in 1977) to 6.7 percent (in 1976).

In spite of the above slowdown in the dynamic, which had already been provided for in the plan, the social productivity of labor was, in the years 1976 to 1980, and especially in industry, the decisive intensifying factor in the growth of national income, covering 98.9 percent of the increase recorded by the industrial sector. The level of coverage in construction is substantially lower, which is primarily the result of the above-mentioned unfavorable situation in 1977 and in 1979.

The overall worsening of the conditions for the further development of the Czechoslovak economy brought about by tautness in the raw material and energy assurance of production, and in some cases by marketing limitations has also contributed to this decline in the growth rate of labor productivity. At the same time, these growth rate figures reflect the overall exhaustion of extensive resources and the insufficient engagement of intensive factors in economic growth, a condition which has appeared most clearly in the inadequate utilization of capital stock, of the labor force and in the insufficient intensity of the necessary changes in the structure of production and its technical sophistication. In addition to factors of a technological nature (structural changes in production, the delayed startup of new facilities, the inadequate modernization of production equipment, etc.), the slowdown in the growth rate of this indicator has also been caused by a low level of engagement of underutilized potential for increased labor productivity related to shortcomings in the organization of production and labor, in the utilization of working hours, and in the failure to adhere to labor and technological discipline. Shortcomings in supplier-consumer relations, which have reached such an extent as to constitute a barrier to further labor-productivity increases, have also been a significant limiting influence. In this area, the slowdown in labor productivity has not been a cause, but a result of a slowdown in the growth of production.

As a consequence of the above realities, neither the industrial nor the construction sectors of the CSR fulfilled the original Sixth Five-Year Plan guidelines for labor-productivity growth (gross production per employee). In industry, only 80.2 percent of this original projection was fulfilled, and only 70 percent of the original projection for construction. However, it is necessary to emphasize in this regard that the magnitude of the above problems led at the same time to plan modifications and, then, to a reduction in the originally projected increase. For instance, for CSR industry the projected increase was reduced from 24.3 percent to 19.6 percent.

During the Sixth Five-Year Plan, labor-productivity growth was achieved in CSR industry by the relative reduction of almost 400,000 employees, and in CSR construction by reductions of roughly 70,000 employees.

2. Development Trends of Certain Factors Influencing Labor Productivity Growth

The Influence of Investment Factors

The influence of these factors had a critical significance (in spite of certain above-mentioned negative trends) for the increase of labor productivity in the Sixth Five-Year Plan, especially in the industrial sector.

The value of capital assets in industry and construction grew continually. For instance, in CSR industry from 1976 to 1980, this value increased 38 percent, and 51 percent in the construction production of the CSR Ministry of Building. On a per employee basis, i.e., expressed as an indicator of capital assets per employee, these figures represent an increase of 35.8 percent and 47.1 percent respectively. This means that the capital assets per employee indicator grew more rapidly in the Sixth Five-Year Plan than the labor-productivity indicator, both in the industrial and construction sectors of the CSR (even though we are considering only the construction production of the CSR Ministry of Building, this sector, both in terms of production volume and capital assets, possesses a critical significance in overall

CSR construction. The more rapid growth of capital assets per employee than of labor productivity meant, on the one hand, a continuation of the so-called investment-intensive type of technical development and, on the other hand, a decline in the efficiency of capital assets (labor productivity may be expressed as the product of assets per worker and capital-asset efficiency). Moreover, it is possible to state that the more rapid increase in capital assets than of the gross production indicator (the dynamic of which is similar to the labor-productivity dynamic) meant an increase in the capital intensiveness of production. The decline in capital-asset efficiency and increase in the capital intensiveness of production in critical sectors of the production sphere of the CSR national economy has been one of the negative phenomena in the area of investment factors.

In addition to capital-asset utilization, a further precondition for an increase in efficiency is also an increase in the technical sophistication of such assets. The technical sophistication of capital assets is characterized by the level of mechanization and automation of machinery and equipment, the content of which from an economic point of view is the degree of substitution of technology for manpower. A statistical study undertaken as of 30 June in 1976, 1978 and 1980 showed that in centrally managed industrial and construction organizations the average level of technical sophistication of machinery and equipment is, basically, stagnating, as shown by the following data:

Structure of Technical Sophistication of Machinery and equipment in CSR Industry and Construction (as of 30 June)

	1976	1978	1980
1. Manually operated	1.14	1.87	1.29
2. Mechanized machinery	39.05	39.60	39.02
3. Partially mechanized	34.46	33.18	32.35
4. Machines	2.98	3.59	4.37
5. Fully automated	8.42	8.70	8.60
6.&7. Machinery	0.92	1.48	3.59
Unclassifiable machinery	13.03	11.58	10.78
Average Technical Sophistication Level of Machinery and Equipment	2.8	2.8	2.9

It is clear from this data that certain partial changes in technical sophistication among individual levels (and the most significant change in classifications 6 and 7) did not substantially influence the overall technical sophistication of machinery and equipment in the above sectors.

Likewise, the level of capital-asset utilization, as measured by the shift-work coefficient, has not evolved in the desired direction. Beginning in 1976, it continually declined in CSR industry. A turnaround in its development occurred in 1979, when its value (1.291) exceeded the 1976 level. The absolute magnitude of the coefficient indicates the existence of considerable underutilized potential in capital-asset utilization.

Over time, inadequate capital-asset utilization not only increases the costliness of production, but above all results in the gradual obsolescence of capital assets. The process of generating resources and of replacing capital assets is disproportionately drawn out. From the above, it follows that scientific and technical development and, above all, its implementation in the production process has not been at a desirable level in our national economy. Technicoeconomic parameters have not changed significantly, and the process of replacing capital assets has often been reduced to the simple exchange of existing equipment. Likewise, the utilization of the existing production stock has not been favorable. The artificial retention of old and fully depreciated production equipment in the production process with the objective of assuring a high number of work openings on the first shift has been the cause of inadequate utilization of machinery and equipment with high technicoeconomic parameters. An increase in the amount of shift work, the elimination of inefficient operations, and the multishift utilization of expensive machinery is at present essential and is the most rapid path to an increase in the efficiency of capital assets in the production process and, thereby, is also one of the paths to an increase in labor productivity.

The Influence of Shifts on Employee Structure

The influence of shifts on the employee structure during the Sixth Five-Year Plan was evident in practically all sectors of the production sphere of the CSR national economy. A consequence of this influence was a deviation in the dynamic of worker labor-productivity growth from the dynamic of employee labor-productivity growth, as documented by the following data:

	Employee Labor Productivity - index 1980/1975	Worker Labor Productivity - index 1980 1975
Industry on CSR territory	119.8	123.1
Construction on CSR territory	120.8	126.8

This share of workers in industrial activity declined in industrial organizations on the territory of the CSR from 69.7 percent in 1975 to 68.4 percent in 1980, while in construction organizations, the share of workers declined from 56.8 percent to 54.4 percent. The trend toward a decline in the percentage of total work performed by workers has an objective character and appears in practically all economically advanced countries. It is connected above all with the advance of scientific and technical progress and the resultant shift of employees to preproduction phases, and with increasing demands on technicoeconomic and service activities. The extent of this decline is, however, disputable, since on the one hand it leads to a directly proportional slowdown in the pace of labor productivity while on the other hand creating the preconditions for its future growth. In our economy, the trend toward a decline in the amount of work performed by workers, in conjunction with technical progress, is clearly intensifying the still substantial administrative difficulties of the current management system, and producing slight pressure toward the economical use of the work force in nonworker classifications. Thus, a substantial part of the increase in new employees is being realized in these nonworker classifications. In addition, this trend is at present supported as well by the preparation structure for qualified personnel. In a situation in which the number of people entering high schools and colleges is constantly growing, there must logically also be an increase in the numbers of those interested in nonworker occupations, and a resultant decline in the percentage of future workers.

Influence of the Length and Utilization of Worktime Fund Following the introduction of a comparative worktime fund 260 working days in length, the magnitude of the worktime fund as a factor in increased labor productivity is significantly influenced only by the amount of overtime work. During the Sixth Five-Year Plan, the amount of overtime work showed a rising trend. In CSR industry, it grew from 5.4 percent in 1975 to 6.0 percent in 1980, and in CSR construction from 4.0 percent in 1975 to 4.5 percent in 1980.

In 1980 the increase in overtime work in industry and construction was arrested, even though, on the other hand, it must be stated that the same percentage (and a lower percentage in construction) in 1979 was influenced by the reality that overtime work in that year became one of the principal measures for eliminating the shortfall resulting from unfavorable developments at the start of the year. Although a certain amount of overtime work is clearly necessary for the resolution of extraordinary tasks, the volume of overtime work in industry and construction during the Sixth Five-Year Plan appears to be excessive. Among the main reasons for inefficient overtime work belong, above all, shortcomings in supplier-consumer relations, shortcomings in managerial and organizational work, temporary shortages in certain professional employee classifications, earnings reasons and others. Overtime work, which in effect lengthens legal working hours, has thus become one of the stable extensive factors in the growth of production and thereby of labor productivity.

The introduction of the comparative worktime fund is connected as well with the problem of so-called working Saturdays, and more specifically with their effectiveness, an analysis of which pointed out their small contribution. Earlier findings from modifications in worktime were once again confirmed, i.e., that the intensity of work declines with a lengthening of working time, and increases when the amount of time is reduced. The resultant effect of working Saturdays is about 50 percent in comparison with other working days. This means that all of the costs of the functioning of the social and administrative structure fall upon roughly 50 percent of normal production levels. Among the basic reasons for this low level of efficiency war, above all, the low level of work intensity, lesser preparation for work, and the like. It is evident that for the assurance of extraordinary tasks or to eliminate the consequences of losses stemming from various disruptions, differentially elected overtime work by only of an essential number of employees is more efficient.

In addition to the above factors, several other factors also affect increased labor productivity, the classification and quantification of which, due to their heterogeneity, is very difficult and would exceed the framework of this article. Nevertheless, it is appropriate to mention briefly still another factor which in the near future should become one of the main impulses for further increases in labor productivity, thereby contributing to a convergence of this indicator with worldwide standards. There still exists significant underutilized potential in this area.

The long-term changes in the structure of production (macrostructural and internal sectorial structural shifts) which are taking place in our country are analagous to worldwide trends (the advance of sectors more demanding of technology and qualifications, and the decline of the less demanding), but are, however, less intensive than in the economically most advanced countries. In addition, priority developments have not always been realized in the prospectively most effective sectors and, moreover, without the proportional cutting back of less promising sectors and products. This is also one of the main reasons that labor productivity in our national economy (in spite of its constant growth) is still significantly below world levels.

The dynamic of labor productivity in CSR industry and construction has been significantly lower in comparison with the rate achieved during the Fifth Five-Year Plan. A substantial portion of this decline has already been incorporated in the plan for the Sixth Five-Year Plan and further emphasized in the annual implementation plans, as a consequence of a reduction in the dynamic of production in conjunction with what amounts to a stagnating level of employment (though there was an increase in construction employment). The main external and internal reasons for this development have already been presented in the introduction. The overall exhaustion of extensive factors of economic growth have not been eliminated to a sufficient extent through the engagement of intensive factors. The implementation of economic intensification is much more difficult that the utilization of the extensive factors of economic growth. Also for this reason a labor productivity growth rate achieved by an intensive path is more difficult to achieve than an "extensive" rate. Given the above-mentioned insufficient intensification, the rate of growth of labor productivity quite logically had to decline.

9276
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CZECHOSLOVAKIA

BRIEFS

NICARAGUA MINING ASSISTANCE DISCUSSED--First Deputy Minister of CSSR Ministry of Foreign Trade L. Vodrazka met with the Nicaraguan Minister of Mines Alvaro Guzman Prague on 23 February. Discussed was the possibility of Czechoslovak participation in reconstruction and development of nonferrous and precious metal mining in Nicaragua. [Prague SVOBODNE SLOVO in Czech 24 Feb 82 p 4]

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SED OFFICIAL PRAISES JAPAN'S ECONOMY, NOTES SIMILARITIES TO GDR

East Berlin HORIZONT in German Vol 15 No 4, 1982 (signed to press 18 Jan 82) pp 16-17

[Article by Prof Dr Otto Reinhold, member, SED Central Committee; rector, Academy of Social Sciences, SED CC: "Japan--Impressions and Analyses"]

[Text] There is almost no other country in the world of capital which has been written about or discussed as much in recent years as is Japan. Erich Honecker's visit in this Far-Eastern country, closer and closer cooperation between the GDR and Japan in economic, scientific-technical and other areas was responsible for the fast growth in our country of the interest in Japanese development. This interest has grown even more since the Tenth SED Party Congress and its economic and social strategy. In some respects Japan finds itself in a similar situation as the GDR does. Almost without exception, raw materials and fuel must be imported and, in turn, finished products have to be exported. The only way to achieve economic success is the best possible refinement of raw materials and fuels through the maximal application of modern science and technology, through international top performance in decisive areas.

The tasks which Japan has to master are clear. But how, in which way, with what means is this to be done? There is no end to the questions. I am sure it is not really necessary to emphasize the fact that we were glad and full of expectations when we were asked to visit the country at the beginning of November 1981 at the invitation of the Theoretical Center of the Japan Socialist Party (JSP). When I say we, I am referring to a delegation from the Academy of Social Sciences at the SED Central Committee, to which Professor Huemmler and I belonged. For a long time we have had close, friendly relations with the Theoretical Center of the JSP, the focal point of which is a fruitful scientific cooperation. These relations were also reflected in the program which had been prepared for our stay. It contained a scientific seminar that lasted for several days and dealt with SED policies following the Tenth Party Congress and the JSP strategy, a number of discussion meetings, visits to several combine plants--among them production departments that were operated exclusively with robots--or plants with almost total automation of production of integrated circuits, a discussion in the Office for Planning the Government, a reception by the Lord Mayor of Hiroshima etc. The highlight of our stay in Japan was a talk with Asukata, who in the meantime has been reelected chairman of the JSP.

All these discussions make possible a number of realizations and conclusions. Two facts will have to be placed at the top. The first thing that becomes apparent is the determination to use all strength available to fight for the preservation of peace, the prevention of a nuclear inferno. In Hiroshima we heard the opinion again and again that whoever saw the consequences of the American atomic bombs will use all his energies to fight against any nuclear adventure. The chairman of the JSP explained that in spite of differences in the forms of the struggle and the specific goals, it is necessary to find a common strategy against the U.S. policy of heavy arms buildup.

It became also clear that Japan's economic success is not caused by any miracle, but it is the exclusive result of diligence, hard work and the creative activity of Japanese workers.

Significant Economic Growth

During the discussion with editors of THE NIHON KEIZAI SHIMBUN, Japan's largest economic paper, it was pointed out with a certain pride that for a very long time there had been three driving forces of economic development in the world of capital--the United States, the FRG and Japan. The United States dropped out some time ago, the FRG has become "tired," only Japan is left. While all the other industrially developed capitalist countries are in a crisis or a phase of stagnation, Japan alone is showing significant economic growth. For 1981 the real growth of the gross national product is estimated at approximately 4.2 percent and in 1982 it may be in excess of 5 percent. The Japanese economy apparently succeeded in overcoming the consequences of the so-called second petroleum crisis of 1979. The main course was a significant acceleration of scientific-technical progress, attainment of international leadership positions in important areas and their short-term transformation into high productivity as well as material- and energy-saving technologies. In the process the conditions were created for a new economic boom at the beginning of the 1980's.

A closer acquaintance with Japan's economy and society shows that, on one hand, they are following the developmental laws and characteristics of the capitalist order; on the other hand, they show a number of specific characteristics. These specific conditions could probably be summarized by the following points:

The first item that has to be mentioned is the specific system of regulations by the state monopoly in connection with the low expenditures for arms. State activities are highly developed in many respects. First of all, it is based on the exact analysis of those areas of science and research that are crucial for Japan. On this basis, comprehensive promotional and financing programs were and are being prepared jointly with participating combines. Examples are micro-electronics, energy- and material-saving technologies. At the present time, a long-term project is being prepared which alone will cost 104,000 million yen and which is to be financed by the state. The goals are unorthodox industrial materials, biotechnologies and electronic elements. The intentions are to develop within the next 8 to 10 years pioneering technologies that will have a vital influence on the structure of the economy.

Since the beginning of the 1970's expenditures for research are increasing much faster in Japan than they are in the United States and the FRG--by about 7 percent per year (4 percent in the FRG and 1.5 percent in the United States). At the same time, however, one must also take into consideration that the share for military research in Japan is extraordinarily low when compared to other imperialist countries, above all, the United States.

Proceeding from the exact determination of the main direction of the scientific development, the regulating activities of the state monopoly are concentrated, above all, on the promotion of an effective economic structure. As a consequence, promising branches of the economy--for instance, microelectronics, robot technology--are supported with state funds, other ineffective areas are curtailed and enterprises in these areas are bought up. There are also other areas of the social reproduction process, among other things, the demand on the domestic market, foreign trade, that are influenced and managed by the state in many different ways.

It is completely clear that the funds for this regulating process by the state monopoly can only be raised because expenditures for arms have to date been extraordinarily low, when compared to other imperialist countries. Again and again we heard the opinion that the U.S. demand for increased military spending by Japan is to impair, above all, Japan's competitiveness.

Utilization of Historic Traditions

The second, and in some respects the most important, characteristic is the utilization of historic traditions within the framework of the state-monopoly system. These traditions are manifold. Among them are the great industry of the workers as well as their discipline and endurance in their work. Above all, however, it also includes their aspirations to work in the same enterprise all their lives, if possible. A change of jobs is in contradiction with their traditional morality.

As a consequence, dominant economic circles are striving to utilize and promote these traditions and habits maximally to create the closet ties possible with the enterprise.

The most important factor of the wage system is therefore the number of years a worker is employed by an enterprise. A number of social facilities are serving this goal as well. As a rule, the unions of the enterprise are organizations of the respective combine. The promotion of this relationship within the combine plays a central role in the management of the entire enterprise. In one of the combines that we visited, all new employees who had just graduated from college or a technical school had to complete a traineeship, which has as its focal point the relationship with hourly and salaried employees and with the union.

It is clear to everybody that lifelong employment is only possible when there is continual growth in production and sales. Within the framework of the capitalist world, however, such growth can only be achieved if top positions on the international market can be obtained, maintained and expanded technologically as well as from the viewpoint of cost and quality of products. Today this means, above all, that the utilization of historic traditions within the framework of the state-monopoly system serves the motivation of the workers in their effort to keep up with scientific-technical progress and maintain high quality. In electronics enterprises we heard the same opinion again and again: The most important thing for us is to remain on top internationally and to beat the Americans.

This spiritual motivation is also the basis for the collective effort to achieve the highest quality. According to Japanese statements there are several thousand quality circles in combine enterprises; all workers are involved, and sometimes the quality of the products are checked daily and necessary measures are established. Discussions with combine representatives revealed the opinions that the most important advantage enjoyed by Japan, when compared to the United States and West Europe, is the fact that it succeeded in motivating Japanese workers spiritually--and not only a small group--to engage in an unconditional struggle for scientific-technical progress and that there is very little resistance to modern technology.

At any rate, it is apparent that the spiritual attitude among workers--laborers as well as members of the scientific-technical intelligentsia--represents a decisive factor in the effort of keeping up with the scientific-technical revolution and the high performance level of the Japanese economy.

Relationship Between Large and Small Enterprise

A third element of Japan's state-monopoly system is the specific relationship between small and large enterprises. One can more or less proceed from the assumption that each of these two areas employes half of the Japanese blue- and white-collar workers respectively. But the decisive factor is not this quantitative relationship but the fact that the small enterprises are completely dependent on the large combine enterprises. In a comprehensive manner, they specialize in shipping many different supplies. This specialization is the cause for their complete dependence. If these supply shipments were eliminated, the majority of the small enterprises would go bankrupt.

This dependence provides combines with the opportunity to dictate production and delivery terms--including prices. Part of this system is also the fact that delivery dates can be determined almost to the hour, so that the combine enterprise can do without keeping its own inventory and the necessary cost connected with it.

Consequently this structure, this relationship between large and small enterprises is not primarily a remnant from the past but, above all, it is a consciously preserved and strictly organized source of high additional profits for the large combine enterprises.

Extensive Striving for Basic and Continuing Education

Finally, a fourth element of the Japanese economic development is the high educational level. At the present time approximately 96 percent of all Japanese youths complete high school. The continuation in colleges and technical schools requires a high performance level. In addition, all combine enterprises have instituted a comprehensive system of continuing education. In those enterprises that we visited you can only become a foreman after completing at least several training courses. It is understood that these training programs take place after work. The interest in these courses is very great, because in addition to the length of employment at the enterprise the development of wages and salaries depends essentially on the successful completion of these continuing education courses.

The extraordinarily intensive striving for basic and continuing education is without doubt one of the decisive sources of high productivity. A characteristic in this respect is that not only specialized knowledge is transmitted, but much attention is given to the development of an attitude which is necessary for the state-monopoly system. It requires a willingness to be productive, discipline, perseverance and hard work while solving complicated problems, training in collective attitudes and cooperation with the respective combines.

Japan's scientific-technical and economic accomplishments are impressive and amazing. At the same time the situation of the working class becomes visible; social disputes and struggles by Japanese workers show that the boundaries of the capitalist order cannot be crossed. A visit to Japan shows that the state-monopoly order has its national variations, different faces, but it cannot change its nature, its fundamental legitimacy and its contradictions. This fact was confirmed again and again during our discussions in Japan with representatives of the labor class as well as the combines. At this time we will only point to a few moments.

The remarkable way in which Japan rose to its current position as an economic power was only possible because military expenditures, military research and arms production are minimal when compared to other industrially developed, capitalist countries--the United States and the FRG, for instance. The Japanese constitution stipulates that armed forces must exclusively serve one purpose, self-defense.

Many combine representatives also know exactly what that means today when it comes to advantages in competition. Because of the growth in economic power and the course of increased arms buildup in the United States, however, more and more forces and interests are moving into the forground, desiring a change in course. More than has been the case to date, they want to transform economic power into political power, create the most stable international spheres of influence possible and, in addition, expand Japan's military power. Aspirations are growing to participate in totally new dimensions of the imperialist arms buildup and in the export of armament.

On one hand, the utilization of historic traditions for the state-monopoly system is a decisive source for the big increase in productivity. But at the same time it is the foundation of a particularly intensive system of capitalist exploitation. Today there is no other industrially developed country where the working class works as hard, as intensive and as long as it does in Japan. This fact has not been changed in spite of a highly developed state of automation. Among industrial countries, Japan is the only one with an official 48-hour workweek--naturally without overtime. The so-called lifelong work in one combine creates a certain job security. But the cost is high because it gives the combine management greater opportunities to carry out its own interests against the working class and it limits considerably the options for the labor union struggle. We were told that many workers even give up their rightfully earned vacation time, because they do not want to endanger this relationship with the combine and, above all, naturally they do not want to imperil their jobs. The living standard of the blue- and white-collar workers is lagging behind those of other comparable countries.

Again and again many discussions pointed to the fact that "lifelong employment" in one enterprise is only possible as long as a minimum of growth can be achieved. Of late a certain slowdown in the rate of growth in combination with a rapid increase in productivity has already led to a few problems and contradictions. It was already necessary to resort to forced retirement and other measures.

Within the framework of the capitalist world economy, conflicts between Japan and the United States as well as the EC states have become much more pronounced, especially during the last year. Japan achieved an export surplus in its trade with these states, which will probably amount to $25 billion for 1981, and in 1982 it will be even higher. To date the United States and the EC countries have not yet come up with effective economic means to meet this expansion. The conseuqence is that the struggle of competition will gradually turn into an economic war.

Japan is an admirable and lovable country. The expansion of relations between the GDR and Japan on the state level, in economic, scientific-technical as well as cultural areas, but particularly with the parties and organizations of the working class and other progressive forces is of great benefit. These relations are based on traditions that go far back into the 19th century but also on many mutual interests which are an effective, strong force in spite of the different social orders.

8991
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POSSIBILITIES FOR USING GEOTHERMAL ENERGY EXAMINED

Leipzig ENERGIETECHNIK in German Vol 31 No 12, Dec 81 (manuscript received 19 Aug 81) pp 457-462

[Article by Dr Andreas Lippold, engineer, Institute for Energy Supply, Dresden: "Possible Uses of Geothermal Energy for Heating"]

[Text] This paper first presents an overview of the international status of geothermal energy useage. The development of the Hot-Dry Rock method and the prototype facilities for using low-heat water at average geothermal depths, have moved geothermal heat within reach as a real and widely available energy source for heat supply. If the geothermal heat is used to cover basic heating needs, the low-heat water cooled to about 5°C by electrically driven heat pumps and the peak load is met by an electric boiler system, there result primary energy utilizations of about 100 percent compared to conventional boilers.

1. Introduction

The pattern of the world's energy consumption indicates that about 30 percent of the primary energy consumption (35 percent of the GDR primary energy consumption) is by heating systems and technological processes operating at a low-temperature level. Under the influence of the constantly increasing expenses for procurement of the primary energy carriers, the use of:

--alternative energy sources (direct and indirect solar energy useage, geothermal energy), usually in connection with

--new energy conversion technologies (electrically powered heat pumps, absorption heat pumps) is becoming increasingly important.

In Central Europe, solar energy is only able to provide low-temperature heat economically due to the meteorologic conditions, e.g. for heating and hot-water preparation. One principle problem in direct solar energy useage is the fact that the greatest radiation intensity and greatest heat consumption, e.g. for space heating, do not coincide. For indirect use of solar energy (e.g. ground water) and of geothermal energy, this problem does not occur.

According to previous experience, geothermal energy does suffer from an extraordinary localization. Anomalies with large geothermal gradients as on Kamchatka Peninsula or in California are well-known.

The technical use of geothermal energy for space heating began in the 18th century on the "Steam field" of Lardarello in Italy mentioned by Dante Alighieri (used in ancient times for balneologic purposes). The start-up of the first geothermal power plant in Lardarello in 1913, its expansion to a present 421 MW electric power, the currently largest geothermal power plant "The Geysers" (USA, 608 MW), the use of thermal waters of the Pannonian basin in Hungary or the geysers of Iceland for space heating are the milestones of previous development in this area up to the beginning of the 1970s.

All these facilities are connected with significant geothermal anomalies which generally occur in regions of younger volcanism. In many countries [1] at present extensive prospecting for geothermal energy is underway with the goal of finding such geothermal anomalies.

The development of low-heat water in France (Paris basin) at nearly average temperature gradients and its use for space heating and the development of the Hot-Dry rock method for generation of heat from dry, hot rocks have made geothermal heat into a real alternative source of energy. Emphasis of research must be directed toward economic technologies for recovery and use of this energy for normal geothermal gradients.

2. Availability of Geothermal Energy

The limiting parameter for the generation of geothermal energy is the poor heat conductance of rocks of the earth's crust of about 2 W/(m · K). According to recent geophysical findings, the temperature at 100 km depth is 1,500 to 3,000°C [2]. The poor heat conductance of the rock means that the heat flow from the earth's interior, related to the earth's surface, is an average 60 mW/m^2, or several thousand times less than the heat flow from the sun to the earth. This low heat flow reaches only about 300 mW/m^2 for anomalies and means that each geothermal deposit has a limited life-span, since at an economic use of geothermal heat, the withdrawn heat flow is much greater than that flowing up from the earth's interior. Consequently, geothermal heat is not (at least for several generations) a regenerative energy source. With the average thermal conductance of 2 W/(m · K) there results an average temperature gradient in the earth's crust of 30 K/km.

The geothermal energy supplies can be broken down into four types of deposits:

1. Hydrothermal convective systems

a) Steam systems

b) High temperature water systems ($t > 150°C$)

c) Low temperature water systems (low-heat water $50 < t < 100°C$)

2. High-pressure steam/water systems

3. Hot-Dry rock systems

4. Magma occlusions in the upper earth's crust

The deposit types 1a, 1b, 2 and 4 are linked with recent vulcanism. Known regions of such occurrances are in Italy (Lardarello), USA, Mexico, Japan and others. In these countries, temperature gradients sometimes of more than 200 k/km are measured. These deposits are exceptions on a world scale and are able to make a certain contribution to the primary energy balance of the affected countries, but overall they cannot achieve any notable percentage.

2.1 The Geothermal Situation in Europe

A world-wide useage of geothermal energy is only possible if we succeed in withdrawing heat from the subsoil, even in regions of normal geothermal steps--generally from greater depths. The heatflow density map of Europe by Hurtig and Cermak [5] shows (fig 1) that geothermal anomalies with $\phi > 100$ mW/m^2 occur only in Iceland, Italy, Hungary (Pannonian Region), FRG (a very small region in the Upper Rhine Valley) and in the Aegean. These anomalies thus cover only a fraction of the particular country (except Iceland). If we were to limit ourselves in future to these anomalies, then the useable potential of earth's heat in Europe would be practically negligible with respect to the primary energy balance.

The geothermal situation in the GDR corresponds to the European average. In the North are slightly warmer flow values equalling those in the Paris region, where geothermal heat is used already on a larger scale.

2.2 Hot-Dry Rock Systems

In depths of 3000 to 4000 meters, the permeability of sedimentary rocks decreases due to the mountain-load so much that the circulation of a heat carrier is impossible. Granite, usually hotter than its environment due to the decay of contained radioactive elements, is practically impermeable. The use of hot, dry rock heat requires the creation of zones with large heat-transfer surfaces and large permeability. The crack surfaces needed for this can be produced hydraulically (hydraulic fracturing). This method represents the state of the art in petroleum pumping. The outline of a hot-dry rock system is shown in figure 2. Two holes are drilled down to 3000 to 4000 meters depth. Between the holes, the rock is broken up so that the required fracture surface and permeability is obtained. Between the injection and delivery holes, a circulation system can be installed. The circulating water withdraws heat from the rock via the fracture surface and transfers the heat, above ground, to another cycle, e.g. a heating cycle.

The generation of a sufficiently large fracture system (for 150 MW heat output about 1 km^2 [1]) by hydraulic fracturing is the fundamental problem of the hot-dry rock method.

Large-scale tests in Los Alamos, N.M. and in Urach (FRG) were designed to answer the following questions:

--Can the crack system be generated so that the circulation system can be operated at reasonable pressures?

--What is the effect of chemical reactions between hot rock and water on the operation?

--What is the long-term behavior of a hot-dry rock source?

--What is the optimum drill-hole pattern?

For the users of this heat source, its long-term behavior is the decisive point. At a constnat temperature withdrawal, the available heat flow decreases exponentially with time. Through a time-variable heat withdrawal in which the average temperature of the circulating water is reduced as a function of time, a constant heat flow can be obtained. In this case however, at the beginning of the operating period, the obtained heat flow lies far below that theoretically possible. In regions of normal geothermal step, the earth heat only comes into consideration as a heat source, since the generation of electricity at this temperature level is possible at an efficiency of only about 5% and the environmental pollution would be 20 to 30 times that of the electric power output.

The use of low-temperature heating systems brings economic advantages since the difference between initial mountain temperature and the average temperature of the circulation system is greatest and the greatest possible quantity of heat can be withdrawn from the reservoir fractured-rock system.

For a heat-supply system of a decentralized housing area, the annual expenses (n = 30 years) were estimated in [3]. At a final depth of drilled holes of 4000 meters and a low-temperature heating system, there results a ratio of annual expense of 1.2:1 compared to soft-coal briquette heating in each house. The system configuration was selected so that geothermal covers about 50 percent of heating needs and the winter peak is filled by the auxiliary heating system (electroboiler/hot-water reservoir).

Using the same geothermal assumptions, Noack et al. [4] arrive at a cost ratio of 1.9:1 using monovalent geothermal supply and conventional parameters. Thus it is clear that above-ground system configuration must take into account the special conditions of geothermy.

2.3 Low-Temperature Water Systems (Low-heat water)

Besides the use of thermal sources, e.g. of the Pannonian basin, recently the geothermal heating Centrals of the Paris basin became known; they use thermal water from the Dogger at depths of 1500 to 2000 m and temperatures of 57 to 75°C (normal geothermal step). The first system in Melun began operation in 1970, in 1976 three other systems came on stream, so that in 1978, 13,000 households in France were geothermally heated. By 1990, this figure will be 400,000 to 500,000. Calculations showed a savings of 13 to 16 percent over conventional oil heating standard in France [2].

The use of low-heat layer water is linked to suitable reservoirs at depths of 1500 to 2000 m. In large sedimentary basins, generally these petrographically suitable and large reservoirs are present. In Upper Paleozoic basins on the Northern territory of the GDR, suitable, sufficiently permeable and porous reservoirs are expected. The layer waters are usually only under hydrostatic pressure, so that at rest, the water level is always below the ground level. Via appropriate immersion pumps, a water delivery is possible. The depression should be selected in accord with the reservoir properties, so that a maximum delivery rate is achieved, and so, e.g. a minimum amount of sand occurs; this will prevent erosion in pumps and pipelines.

In general, the high level of minerals in the pumped and cooled water (more than 200 g/1) will not permit above-ground purification, due to the environmental pollution. Thus, for the first time, the French system in Creil by Paris used a reinjection of the cooled water into the same reservoir level; the following advantages were achieved:

--No pollution by mineralized water

--Possible collapse of the earth's surface is avoided

--Only about 25 percent of the total heat content of the reservoir is contained in the water. By reinjection of the cold water, the heat of the rocks can be used again, thus more than doubling the available heat energy

--The delivery rates at the same depression are 1.5 times greater in a two-hole system with delivery and reinjection hole than for a simple delivery hole [7] due to the maintenance of the initial pressure of the deposit.

Under these considerations, even smaller reservoirs with petrographically unfavorable conditions gain importance, and the costs for the second hole are compensated by the named advantages.

3. Geothermal Heating Centrals with Low-Heat Water

In the section on the Hot-Dry rock deposits, the importance of above-ground system configuration for the economics of geothermal heat useage was pointed out.

3.1 Thermal System Configuration

Experiences in remote heat supply have shown that for a peak heat output of the remote heat system of 50 percent of the max. heat load, only around 10 percent of the annual heating needs occur (at 25 percent, only 1 percent). Since the deep drilling costs affect the geothermal heating Centrals, it was suggested to adopt methods of remote heat supply: The energy-minimum, maximum-investment heat generation version (low-heat water, comparable with heat power plant) takes over the base heat demand, and a minimum investment system (heat-plant in remote heat supply) with generally higher operating (energy) costs, takes over the peak heat load.

The personnel needed to operate the drilling system is very low [2]. The peak heating system which in the worst case has a maximum full-load useage of 500 hours/year, must take this into account. In the French systems, oil or gas boilers are used. In the GDR, under consideration of the particular load situation in the electric energy grid and the local supply net, electric boilers could be considered; these can charge hot-water boilers with low-cost "night" electricity. The geothermal heating centrals is then viewed as a single-rail supplier which combines the advantages of decentral siting with a very good primary energy utilization.

In the Northern sediment basin of the GDR at depths of 1200 to 2000 meters, temperatures of the thermal water of 60 to 80°C are expected [6]. These temperatures require the use of low-temperature heaters (e.g. $t_V/t_R = 65/35$). The heat content of the low-heat could only be used 30 to 50 percent. The use of heat pumps permits a further cooling down to 5°C at power coefficients of the heat pump system of $\varepsilon = 4$ to 4.5.

The annual useage for heating and domestic hot water with the corresponding fractions of

--electric energy for delivery pumps

--electric energy for heat pumps

--geothermal energy, direct useage or via heat pump

--electric energy for peak heating system

is shown in figure 3 for a linkage factor of 0.5. Since the heat pumps are operated only outside the periods of peak demand for electric energy, a geothermal heating central uses mainly the power reserves of the electric energy grid. One possible heat circuit of a geothermal central heating is shown in fig 4. The circuit must assure that the thermal water is used directly without heat pump as much as possible. Thus, a central domestic hot-water supply is useful, whose first stage cools the thermal water down to about 35°C. Since the domestic hot water is operated all year long, the final heating of this water is with the thermal water coming directly from the hole. The recycled hot mains water is preheated in a large-sized heat exchanger (at less than full load operation, the fraction of direct useage becomes greater, due to the lower return temperature) and finally goes into the condensors of the heat pumps. Condensors and vaporizer of the heat pumps are circuited in series in order to simulate the Lorenz process for the large vaporizer temperature spread of 30 K. At outside temperatures below zero degrees centigrade, hot water of about 160°C is mixed in via the inlet temperature controller through the motor valve, so that the needed inlet temperatures are attained. The hot water is produced at night and fed into tanks which can be used during the transition time as low-temperature reservoirs. Due to the corrosiveness of the thermal water, it may be necessary to use an intermediate loop before running the thermal water into the vaporizer.

3.2 Economy

The determination of the minimum-cost linkage factor x is a real optimization problem. With increasing linkage factor electric boiler/geothermy, the annual primary energy efficiency, the ratio of used energy to expended fuel energy, improves (fig 5). Due to the annual useage of space heating, an enlargement of the linkage factor above 0.75 brings only a minor improvement in primary energy utilization. The expense for the drilled holes is no longer in an acceptable proportion with the primary energy savings. The annual expense for improving the primary energy utilization from 1.1 to 1.2 is increased by only about 2 percent, whereas a 13 percent increase in expenses is needed to improve the primary energy utilization from 1.58 to 1.68 ($x=1$, $t_{geo} = 80°C$; figure 6). The maximum primary energy utilization factor is reached when geothermal energy without heat pumps covers the greatest heat demand. The expense for this version is 100 percent and more over that having a link factor of $x = 1$ and cooling with heat pumps, depending on temperature and depth.

If equal delivery rates are reached in different reservoir horizontals at various depths at constant geothermal step, then these horizontals may be equivalent in the region $x < 0.7$ on an annual expense basis. In such a case, it will always be expedient to pump from the upper horisontals.

The annual expense for a geothermal central heating including extra expense for the low-temperature heating system was related to the annual expense of a small, decentral heating plant based on a link-boiler using soft coal briquettes in the Northern GDR, or to a heat-supply version of small, decentral housing units. Figure 6 underlines that today, geothermal use via low-temperature water can be a viable alternative heat supply variant.

4. Summary

The technologies for utilization of geothermal energy and the constantly growing expenses for extraction of conventional energy carriers have moved geothermal heat within grasp as an alternative energy source. The development in this area by the year 2000 will be characterized by initial prototype facilities using the Hot-Dry rock principle and a larger number of heating centrals using low-heat water. These central heating units world-wide will not make any notable contribution to the primary energy balance, but regionally, in unfavorable areas from a supply standpoint (e.g. expensive fuel transport) they can represent a relief to the energy supply. The heating circuit of central heating affects the economy of geothermal heating significantly. Under the conditons in the GDR, a simple, single rail version of central heating will be preferred. It connects the undisputed advantages of night-reservoir heating while excluding its disadvantage: The primary energy utilization is improved from 0.27 to 0.9 - 1.1, depending on the design.

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Figure 1. Heat Flow Map of Europe, from Cermak and Hurtig [5].

Key:

1-regions of low heat flow
2-regions of high heat flow
3-lines of constant heat flow in 10 mW/m^2 (e.g. 80 mW/m^3 Lines (4,6,8,10,12) of constant heat flow

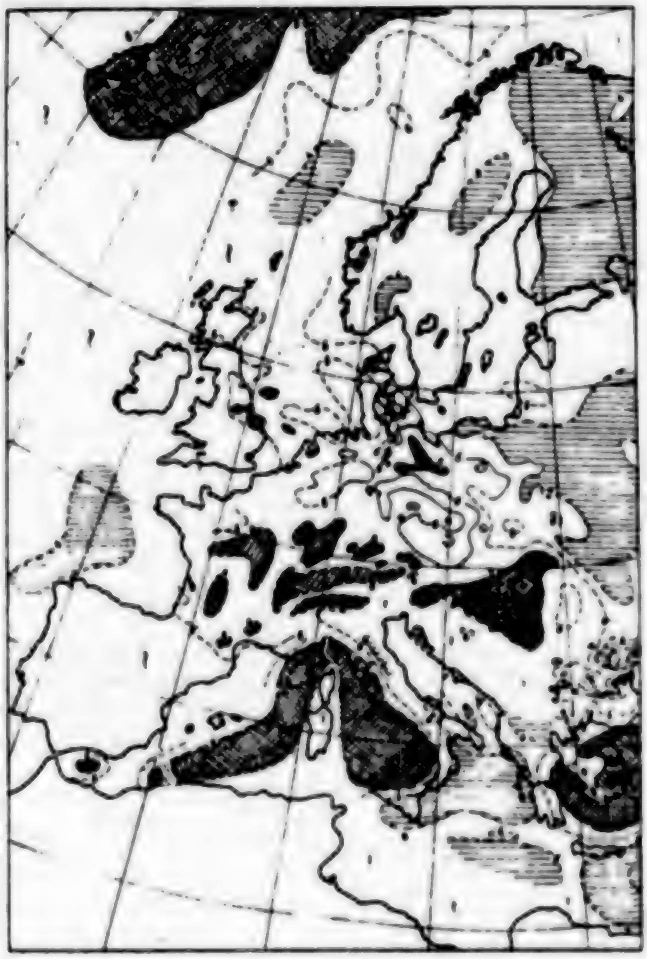


Bild 1. Wärmeflußkarte von Europa nach *Cermak* und *Hurtig* [3]

▤ 1 **Regionen niedrigen Wärmeflusses ($\dot{q} \leq 40$ mW/m^2)**

▩ 2 **Regionen hohen Wärmeflusses ($\dot{q} \geq 80$ mW/m^2)**

— 8 — 3 **Linien konstanten Wärmeflusses in 10 mW/m^2 (z. B. 80 mW/m^2)**

Linien (4, 6, 8, 10, 12) konstanten Wärmeflusses

Figure 2. Schematic of a Hot-Dry Rock System

Key:

1-delivery hole
2-injection hole
3-crystalline rock
4-final depth
5-fracture zone

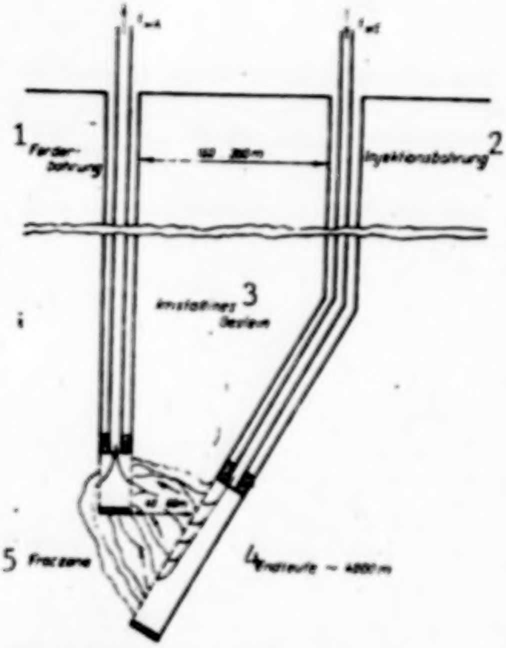


Bild 2. Schema einer Hot-Dry-Rock-Anlage

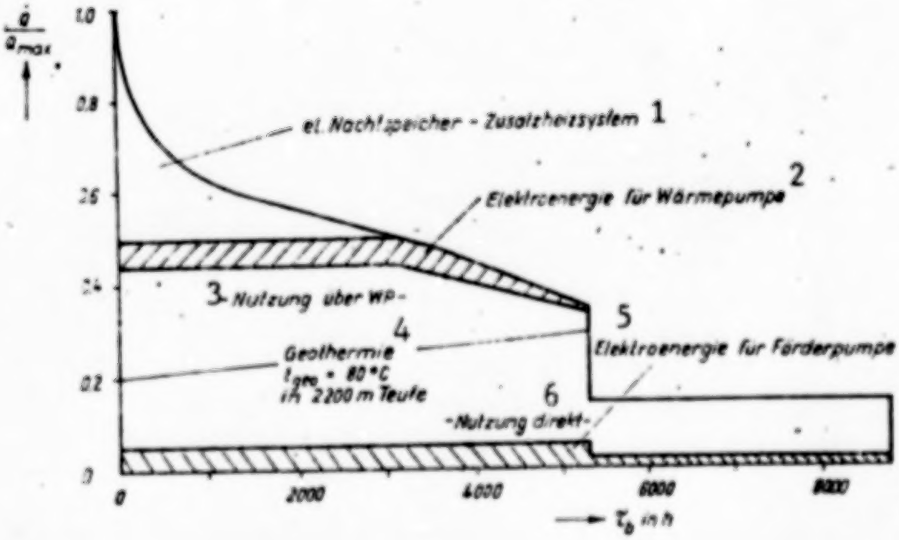


Bild 3. Jahresdauerlinie für Raumheizung, Anteile der Energieträger für einen Koppelfaktor x = 0,5

Figure 3. Annual Useage of Space Heating, Fractions of Energy Carrier for a Linkage factor of x = 0.5

Key:

1-electric night reservoir, auxiliary heating system
2-electric energy for heat pump
3-used by heat pump
4-geothermal t geo = 80°C at 2200 m depth
5-electric energy for delivery pump
6-direct utilization

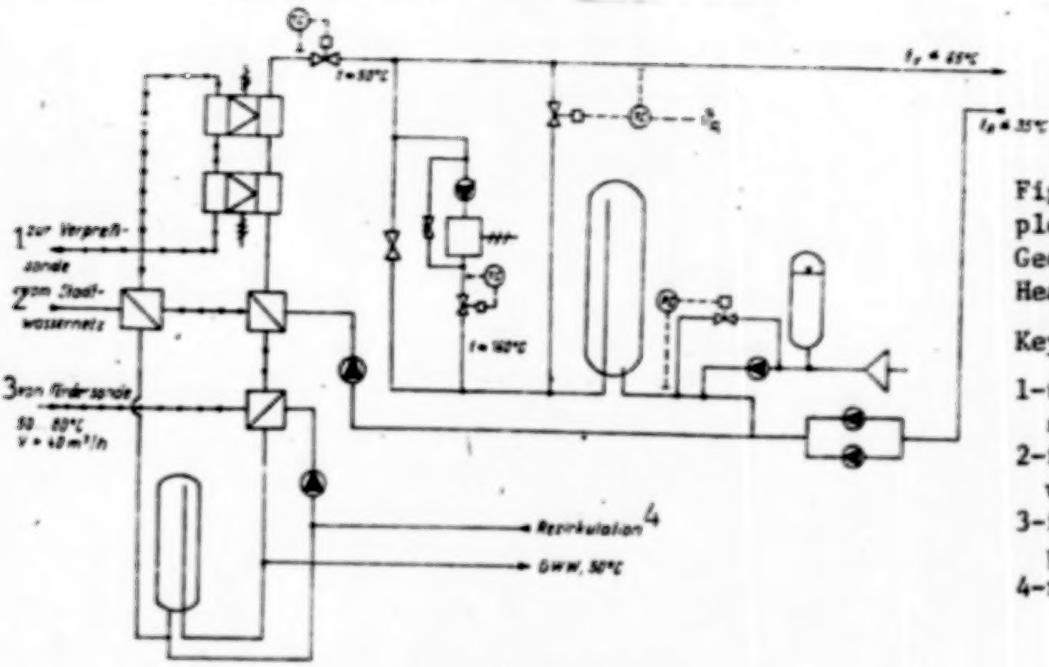


Bild 4. Wärmetechnisches Prinzipschaltbild einer geothermischen Heizzentrale

Figure 4. Principle Circuitry of a Geothermal Central Heating Unit

Key:

1-to the compression probe
2-from the city water mains
3-from delivery probe
4-recirculation

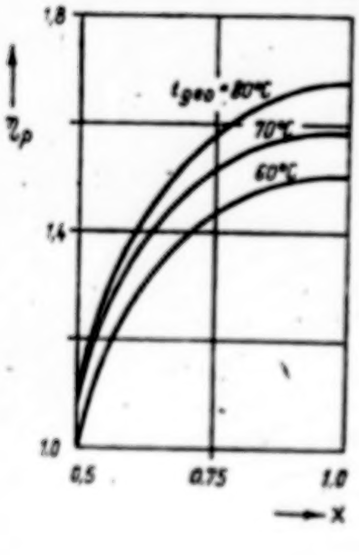
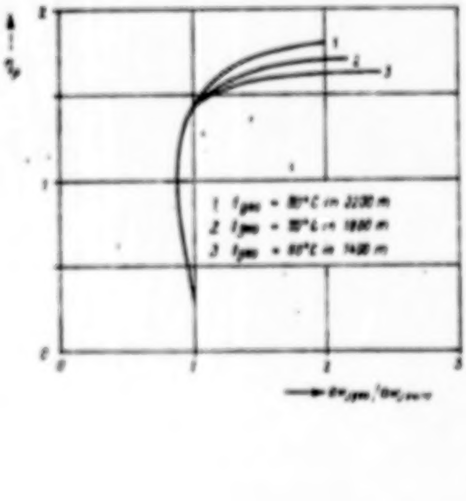


Bild 5. Jährliche Primärenergieausnutzung einer geothermischen Heizzentrale mit Elektrokessel als Spitzenheizsystem mit Niedrigthermalwasser in Abhängigkeit des Koppelfaktors

Figure 5. Annual Primary Energy Utilization of a Geothermal Central Heating System with Electric Boiler as Peak-load System with Low-heat water as a Function of the Linkage Factor

Bild 6, rechts Primärenergieausnutzung als Funktion des jährlichen Aufwandes

Figure 6. (Right) Primary Energy Utilization as a Function of the Annual Expense



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